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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,795	12/14/2001	Elizabeth Acton	608-326	4355

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NIXON & VANDERHYE P.C.
8th Floor
1100 North Glebe Road
Arlington, VA 22201

EXAMINER
KUHAR, ANTHONY J

ART UNIT	PAPER NUMBER
1754	12

DATE MAILED: 08/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/014,795	Applicant(s) ACTON ET AL.	
	Examiner Anthony J Kuhar	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) 1-7 and 19-24 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 8-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Applicant's election of claims 8-18 in Paper No. 11 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-7 and 19-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Specification

This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "the treated aqueous supersaturated solution". There is insufficient antecedent basis for this limitation in the claim.

Claim 8 is indefinite as it depends from nonelected claim 1.

In claim 15, line 27, "which subjected" is awkward and ungrammatical.

In claim 16, "500 /o w/w" is indefinite as to what this means.

In claim 17, "the distribution steps" lacks antecedent basis.

In claim 18, "complementary ion" is indefinite as to what is considered to be such.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 8 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 0916 622 A1.

On page 4, lines 13-14, a crystal with a same or similar form as a scale substance with an average diameter of 0.05 to 100 μm is disclosed. Page 4, line 23 teaches this crystal can be dispersed into water to form a slurry. The slurry is added to a process water in the condition of supersaturation containing the scale substance (see page 4, lines 51-54). It appears from the examples that the weight percent of the seed crystals from the dispersion to that of the seed crystals and mineral salts is between 10 and 50%.

Claims 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Thijssen '886.

Thijssen '886 discloses a two-stage crystallization zone where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15). The nuclei are

dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thijssen '886.

Thijssen '886 discloses a two-stage crystallization zone where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15). The nuclei are dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone. Because both the prior art and the applicant disclose similar processes and the idea of using ultrasound in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. Also, regarding claim 14, the degree of concentration (supersaturation) would appear to be suggested by Thijssen.

Claims 8-10, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thijssen '886 in view of Baumgard '966.

Thijssen '886 discloses a two-stage crystallization process where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches

the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15. The nuclei are dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone. Because both the prior art and the applicant disclose similar processes using ultrasound in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. Thijssen '886 does not disclose operating the crystallization process in series or parallel.

Baumgard '966 teaches a similar crystallization process where a crystal suspension of a particular enantiomer is added to a mixture of enantiomers; the crystallization process is preferred in series or parallel mode. At the time the invention was made, one of ordinary skill in the art would have been motivated to use the methods of Thijssen with the teachings of Baumgard because Baumgard teaches that in series, the crystals of the first process can be used to seed crystallization in the next process (see column 5, lines 20-25). Baumgard also teaches in parallel, there is a high space time yield of crystals, which in the case of the applicant means fewer crystals in solution will be available to scale on the walls of the equipment. Also, there is an advantage in not interrupting the process in case one piece of equipment breaks down (see column 5, lines 25-30). One of ordinary skill in the art would have been motivated to do this because these advantages contribute to the economic efficiency of the process itself.

Claims 8-10, 14, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thijssen '886 in view of Steward '194.

Thijssen '886 discloses a two-stage crystallization process where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15). The nuclei are dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone. Because both the prior art and the applicant disclose similar processes and the idea of using ultrasound in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. Thijssen '886 does not disclose an aqueous precursor liquid that is converted to a supersaturated solution by cooling, reducing pressure, or adding a complementary ion.

Steward '194 discloses, in a similar process for crystallization, a two stage process where the temperature of a solution is reduced to induce crystallization in a first stage to produce crystals of a small particle size, and these crystals are sent to a second stage to induce crystallization in a supersaturated solution (see claim 1). The weight of crystals in the first stage over the weight of the crystals in the first stage and the amount of depositable salts in the second stage appear to be between 10 and 50% (see column 2, line 48). At the time the invention was

made, one of ordinary skill in the art would have been motivated to use the method of Thijssen and additionally cool a solution to supersaturation before formation of small crystals in a dispersion because Steward teaches the preformed crystals can be used as to scour heat exchange surfaces and prevent crystal growth on these surfaces (see column 2, lines 25-32). One of ordinary skill in the art would have been motivated to do this because cooling the initial solution first to supersaturation helps to form the initial small crystals, which ultimately helps prevent scaling on equipment surfaces.

Claims 8-11, 13, 14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thijssen '886 in view of Botsaris '966.

Thijssen '886 discloses a two-stage crystallization process where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15). The nuclei are dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone.). Thijssen '886 does not disclose the length of time of ultrasound, the frequency of the ultrasound, nor supercooling the aqueous precursor liquid in the crystallization zone.

Botsaris '966 teaches, in a similar crystallization process, the use of ultrasound to initiate nucleation in a two step crystallization process (see column 2, lines 45-50). Frequencies of 20-23 kHz are taught in column 4, line 27 and residence times of 1 to 15 minutes are taught in column 4, lines 39-30. Column 3, lines 25-29 show the liquid in the crystallizer is maintained at a supercooled temperature. Because the combined prior art use ultrasonic vibrations in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. At the time the invention was made, one of ordinary skill in the art would have used the frequency and residence time taught by Botsaris with the process taught by Thijssen because Botsaris teaches that the use of ultrasound in his invention enables nucleation at low levels of supercooling, excellent control of the process, and easy scale-up (see column 3, lines 50-63). One of ordinary skill in the art would have been motivated to do this because the benefits of ultrasound listed hitherto contribute to better efficiency of the process.

Claims 8-12 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thijssen '886 in view of Lindrund '958.

Thijssen '886 discloses a two-stage crystallization process where there is first a nuclei-formation zone where small crystal nuclei are formed (see column 3, line 55). Thijssen teaches these crystals have a diameter of 0.1 to 10 microns in column 3, line 28. Thijssen further teaches the precrystallization zone is brought to supersaturation. The formation of nuclei then may occur by subjecting the solution to ultrasonic vibrations (see column 5, lines 10, 14-15). The nuclei are dissolved in the solution of the crystallization zone (see column 3, line 60). Figure 3 discloses a

supersaturated solution that the nuclei are dissolved in. In the examples, the mineral salt suspension formed in the precrystallization zone is the same mineral salt as that present in the crystallization zone. Thijssen '886 does not disclose the frequency of nor the power applied by the ultrasound.

Lindrud '958 discloses a process for crystallizing sub-micron size particles using a sonication probe along with impinging jets to achieve high intensity micromixing of fluids so as to form a homogenous composition prior to the start of nucleation (see column 1, lines 64-65). A high level of supersaturation exists at the point where the two jets contact (see column 1, lines 31-32). A frequency of 20 kHz is disclosed in column 3, line 5 as well as a power requirement of up to 500 watts in column 3, line 13. Depending on the size of the vessel and the residence time of the liquid, which would be obvious for one skilled in the art to adjust to optimize the crystal size, this translates to about 1-100 J/cm^3 (see In re Aller et al, 105 USPQ 233.) Because the combined prior art uses ultrasound in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the sonication probe and impinging jets of Lindrund with the process of Thijssen because Lindrund teaches the very small crystals provide for a higher dissolution rate. Small crystals would be advantageous in the crystallization zone of Thijssen. One of ordinary skill in the art would have been motivated to do this because a better dissolution rate in the crystallization zone of Thijssen means a better availability of these small crystals for other crystals in the solution to grow on rather than producing scale on equipment.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J Kuhar whose telephone number is 703-305-7095. The examiner can normally be reached on 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stan Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-305-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

AK

AK
August 21, 2002

STEVEN BOS
PRIMARY EXAMINER
GROUP 1100